

## AMPHIBIA: ANURA: LEPTODACTYLIDAE

## ELEUTHERODACTYLUS MARTINICENSIS

## Catalogue of American Amphibians and Reptiles.

Kaiser, H. and J.D. Hardy, Jr. 1994. *Eleutherodactylus martinicensis*.

***Eleutherodactylus martinicensis* (Tschudi)**  
**Brown Whistling Frog, Rainette brun**

*Hyla martinicensis*: Tschudi, 1838:37. *Nomen nudum* (see Nomenclatural History).

*Hylodes martinicensis* Tschudi, 1838:77. Type-locality: "von der Insel Martinique" (but see Distribution). Six syntypes, Muséum National d'Histoire Naturelle, Paris (MNHN) 4881-83, 4883A-C, collected by M. Plée (examined by authors).

*Eleutherodactylus martinicensis*: Duméril and Bibron, 1841:620.

*Eleutherodactylus auriculatus*: Stejneger, 1904:583 (part; see Comments).

*Eleutherodactylus johnstonei*: Barbour, 1914:249 (part; see Comments).

• **Content.** The species is monotypic.

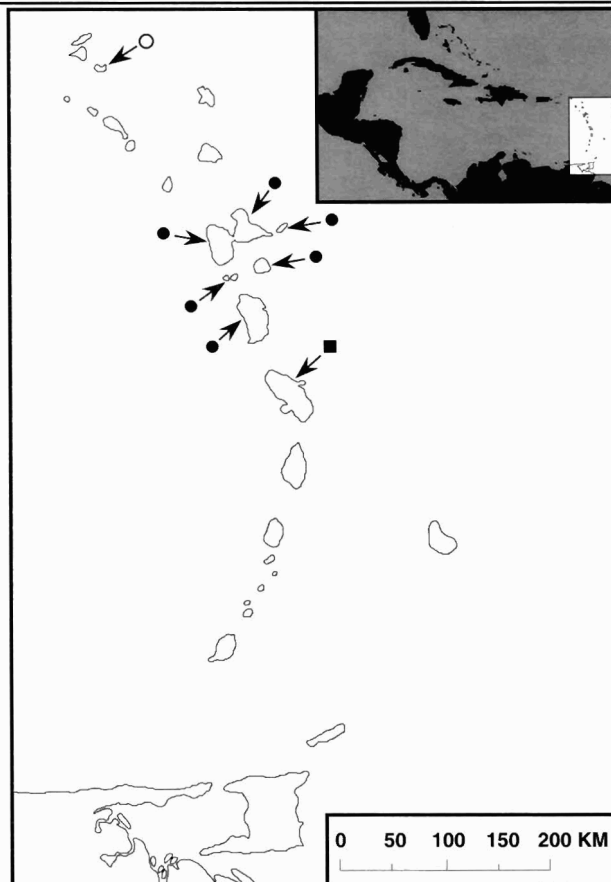
• **Definition.** This species is a medium-sized *Eleutherodactylus* (males and females to 32 and 47 mm SVL, respectively), placed by Schwartz (1967, 1969) into the *E. auriculatus* species group. Dorsal coloration is dark brown to light grayish-brown, with a great variety of dorsal patterns. Most specimens have a scapular chevron, often in combination with one or more other pattern elements, such as a second chevron, a pale median hairline, or pale dorsolateral stripes (Schwartz, 1967). Detailed descriptions of pattern variation were given by Schwartz (1967).

• **Diagnosis.** This species of *Eleutherodactylus* may be distinguished from all other members of the genus by the following characteristics: medium length hind limbs (tibia  $\bar{x}$  = 46.8±4.0% SVL), moderate head width ( $\bar{x}$  = 40.2±2.6% SVL), hidden surfaces of hind limbs and groin irregularly patterned, but never colored red. Choanae are small; dentigerous processes of vomers occur in short diagonally placed patches, not quite enclosed within inner margins of choanae. Outer margin of choanae are obscured when viewed from below. Inguinal glands are absent.

• **Descriptions.** The first full description of the species was published by Duméril and Bibron (1841). Schwartz (1967) listed the morphological characteristics of *Eleutherodactylus martinicensis*, emphasizing those diagnostic vis-à-vis *E. johnstonei*, in his comparative synopsis of Lesser Antillean *Eleutherodactylus*. He also included some morphometric characters to enable inter-island comparisons. Other, briefer descriptions were provided by Krintler (1986) and Schwartz and Henderson (1991). Several other descriptions of specimens or collection lists (Parker, 1933; Dunn, 1934; Bayley, 1950; Goin and Cooper, 1950; Lynn, 1957; Grant, 1959; Adamson et al., 1960; Hughes, 1962) are actually in reference to *E. johnstonei*. Joglar (1986, 1989) listed *E. martinicensis* as a member of his *unistrigatus* group and provided a character state list for 52 morphological and life history characters. Hedges (1988, 1989) placed this species into his



Figure 1. *Eleutherodactylus martinicensis* from Guadeloupe.

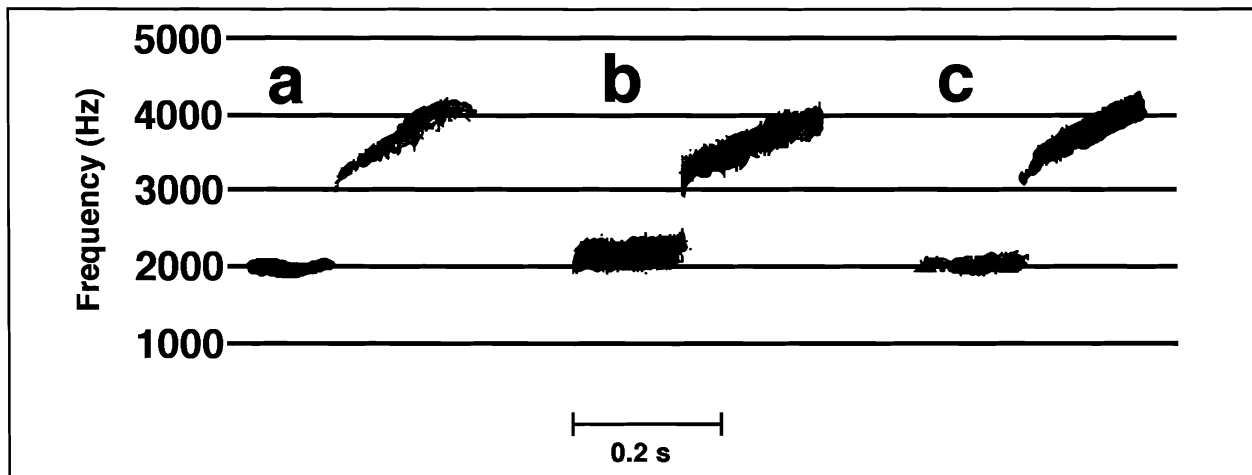


Map. The solid square is the island where the type was collected (Schwartz, 1967). Dots indicate historic locality records, the circle represents a recent introduction.

subgenus *Eleutherodactylus*, *auriculatus* section, *martinicensis* series, *martinicensis* group, together with the other Lesser Antillean species listed by Schwartz (1967). The call of *E. martinicensis*, described by Hardy and Harris (1979) and Kaiser (1992), consists of two notes. The first note has a mean frequency near 2000 Hz and a duration of between 0.09 and 0.13 s. The second note is longer (duration 0.17–0.23 s) and ascends from a frequency of about 3100–4200 Hz, without reaching a dominant plateau frequency. The average interval between successive calls is 1.5 s, with a maximum of about 50 calls per minute.

• **Illustrations.** Photographs of *E. martinicensis* appeared in Howes (1931) and Krintler (1986). An egg clutch and a developing embryo in ovo are pictured in Howes (1930). Line drawings of whole animals or appendages were presented by Duméril et al. (1854: Fig. 89: 2, 2a), Peters (1876), and Schwartz (1967). The skull and hyoid apparatus are figured in Parker (1882) and the side of the head and the roof of the mouth in Lynch (1965). Illustrations of the ilium were provided by Lynch (1965, 1966). Audiospectrograms of the mating call were published by Hardy and Harris (1979) and Kaiser (1992).

• **Distribution.** Although the type locality was given as Martinique by M. Plée, who oversaw the collection of Caribbean material at the time, Schwartz (1967) argued convincingly that the type locality was most likely Guadeloupe. Schwartz and Henderson (1991) included in the range of *E. martinicensis* only the central Lesser Antilles (Dominica, Guadeloupe and its larger satellites, Martinique). Although Schwartz (1967) and Schwartz and Thomas (1975) recorded *E. martinicensis* from Antigua, Pregill et al. (1988) attributed these to confusion with *E. johnstonei*. Lichtenstein [and von Martens] (1856) recorded what was termed "*Hylodes martinicensis*" from Caracas, Venezuela, but most likely referred to a different species (Hardy and Harris, 1979). Cope (1879) listed the species on Tobago, but Tuck and Hardy (1973) considered this an erroneous locality. Lescuré (1983) suggested that the species may



**Figure 2.** Audiospectrograms of the call of *Eleutherodactylus martinicensis*: (a) Anse aux Flamandes, St. Barthélemy, 3 January 1990; (b) Chutes du Carbet, Guadeloupe, 7 January, 1990; (c) Morne Bigot, Martinique, 5 January 1990. All calls recorded by H. Kaiser and H.H. Schwartz.

have been introduced accidentally to Dominica by refugees from Martinique and Guadeloupe during the French Revolution, but whether these transfers of live frogs constituted reinforcements of existing populations or new arrivals is uncertain. Stejneger (1904) commented that *E. martinicensis* was introduced to Guadeloupe from Martinique, but provided no evidence. The species was recently introduced on St. Barthélemy (Kaiser, 1992). We have personally verified the distributions on all the above islands, and concur with Pregill et al. (1988) that the species is absent from Antigua.

• **Fossil Record.** None.

• **Pertinent Literature.** The most comprehensive descriptions of the morphology of *E. martinicensis* are those by Parker (1882) and Schwartz (1967). Shorter descriptions are in Nieden (1923), Krintler (1986), and Schwartz and Henderson (1991). A morphometric comparison of *E. martinicensis* and *E. barlagnei* was conducted by Lynch (1965). Development and various aspects of embryonal morphology were described by Bavay (1872, 1873a, b, c, d, 1875) and Selenka (1882). The account of Sampson (1904) described the embryology of *E. luteolus* and *E. nubicola* and not, as stated, *E. martinicensis* (Gitlin, 1944). Griffiths (1954) detailed the structure of the otic region and Hardy (1984) described the egg tooth. Zug (1978) investigated jumping performance and its relation to body size. Lescure (1966) commented on the relationship of humidity and calling behavior, and the conservation status of the species was assessed by Kaiser and Henderson (1994). Hardy and Harris (1979) and Hardy (1985) compared leg muscle proteins of *E. martinicensis* with those of several other Antillean species. A more complete analysis of allozyme polymorphisms and systematic relationships among Eastern Caribbean *Eleutherodactylus* was carried out by Kaiser et al. (1994). Goin et al. (1968) listed the amount of DNA per nucleus (in absorption units). Hardy (1985) gave a chromosome count of  $2n = 28$ . Starrett (1968) discussed aspects of jaw structure and musculature. Lynch (1986) showed that *E. martinicensis* has the plesiomorphic ("S") condition of the mandibular ramus of the trigeminal nerve and used this information to state that *E. martinicensis* and other West Indian *Eleutherodactylus* could not be related to the subgenus *Craugastor*.

• **Nomenclatural History.** Although *E. martinicensis* is the genotype of the genus *Eleutherodactylus*, Duméril and Bibron (1841) coined this name in a manner barely acceptable by nomenclatorial rules (Myers, 1962). In their description of a frog species from Martinique, they used the name *Hylodes martinicensis* Tschudi, appending "Synonymie. *Eleutherodactylus Martinicensis*. Nob. M. S. S." [synonymous with *Eleutherodactylus martinicensis* from our manuscript] (Duméril and Bibron, 1841:620). Thus, Stejneger (1904) actually resurrected what should be considered a manuscript name (see Myers, 1962 for a more complete account of the complicated nomenclatorial history of this genus and its synonyms). In describing *E. johnstonei* from Grenada and St. Vincent, Barbour (1914) attempted to clearly differentiate his new species from *E. martinicensis*,

acknowledging the confounding similarity of the two. By his own standards, however, Barbour's distinction was unsuccessful, and sixteen years later (Barbour, 1930), he gave the range as "Grenada? St. Vincent (?extinct)." His omission of *E. johnstonei* from his two subsequent checklists (Barbour, 1935, 1937) implies that Barbour may actually have rejected the name he coined. Subsequent publications on these types of Lesser Antillean frogs confounded the taxonomy (e.g., Parker, 1933; Dunn, 1934; Goin and Cooper, 1950; Lynn, 1957; Grant, 1959; Adamson et al., 1960; Hughes, 1962), with authors applying the name *E. martinicensis* to populations that were actually *E. johnstonei*. Although Schwartz (1967) and Wingate (1969) clearly redefined *E. johnstonei*, some authors continued the erroneous use of *E. martinicensis* (Kenny, 1969; Lemon, 1971). The species has also been confused with endemics from Jamaica (Sampson, 1904) and Puerto Rico (Schmidt, 1927). Additional explanations of taxonomy and nomenclature were provided by Schwartz (1967) and Wingate (1969). Verification of species designations if locality data are imprecise or unavailable remains difficult.

• **Remarks.** Next to *E. johnstonei*, *E. martinicensis* appears to be the only other Lesser Antillean *Eleutherodactylus* whose range has been expanded by human-mitigated introductions (Kaiser, 1992). Although Barbour (1930) made a point in recognizing the ease with which this species may be transported, and although several other authors suggested that plant or vegetable matter may have carried anuran stowaways (Goin, 1944; Censky, 1989; Kaiser, 1992), these records are most likely referable to *E. johnstonei* (see Comments).

The French vernacular "rainette brun" is commonly used in the French Antilles; the English version is a free translation.

• **Etymology.** Tschudi (1838) named the species after the island of Martinique, which he believed to be the origin of the syntypes.

• **Comments.** Our observations over the past decade on Guadeloupe and Martinique indicate that the range of *E. martinicensis* populations has contracted since the introduction of *E. johnstonei*. Seemingly, *E. martinicensis* is gradually becoming displaced by *E. johnstonei* in many localities on both islands. Despite its apparently successful colonization of St. Barthélemy, an island lacking frogs altogether until recently, we do not consider *E. martinicensis* to be a strong competitor or colonizing species.

A persistent problem with the taxonomy of this species has been the way in which it was originally defined by Duméril and Bibron (1841). J.J. Tschudi inadvertently preceded his French colleagues when mentioning their material of the Caribbean tree frogs in his 1838 monograph, using the name *Hylodes martinicensis* (see Myers, 1962). Knowing this, Duméril and Bibron deferred to Tschudi's choice and reverted to the name *Hylodes* from *Eleutherodactylus*, the name they intended to coin in their book and the name which Tschudi saw on the specimen bottle. At that time, Bibron was engaged in the difficult task of sorting into known and undescribed forms the material collected by Plée. This process had become

particularly formidable as a result of Plée's death on Martinique. All of the specimens collected during Plée's trips throughout the Caribbean had been stored on Martinique for eventual shipment to Paris. After Plée's death, however, the governor expedited the process, and upon arrival in Paris the collecting locality for all specimens was recorded as "Martinique" (Plée's field notes have not been studied in detail, but are still archived in the main library of the MNHN). In his species-level taxonomy, Bibron gave undescribed forms a name with the appended notation "M.S.S." to indicate that this was an unpublished (manuscript) name. Thus, the above quote from their monograph may have been nothing more than a cautionary note by Bibron, to anyone using the Paris collections, stating that the name on the jar was a synonymy and needed changing (or further study). However, in mentioning their manuscript name but once in their actual account, Duméril and Bibron did unintentionally create *Eleutherodactylus* as a successor nomen to *Hylodes*. Part of the reason that confusion over the morphology of *E. johnstonei* and *E. martinicensis* has lingered for almost a century is attributable to the use of mixed specimens. Some of Stejneger's (1904) material of *E. martinicensis*, for example, actually came from St. Kitts, where *E. johnstonei* is the only *Eleutherodactylus*. The observations made by Barbour (1914) may also have been based on material including both *E. johnstonei* and *E. martinicensis*, as evidenced by his locality list.

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